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Socioeconomic Status in Childhood Asthma

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This study examines the relationship between socioeconomic status (SES) and asthma prevalence and the use of asthma medication. One thousand and fifty European children aged eight and nine years were studied by parent completed questionnaire and histamine inhalation challenge. After controlling for sex of the child and for smokers in the house there were significantly higher lifetime ($P = 0.029$) and current ($P = 0.046$) prevalence rates of wheeze in children in low SES groups. There was no relationship between SES and asthma diagnosis, bronchial hyperresponsiveness (BHR: PD20 <7.8 μmol), or any combination of BHR with symptoms or diagnosis.

The use of bronchodilators and asthma prophylactic drugs was less frequent in the low SES groups of children with wheeze in the last 12 months both with concurrent BHR or irrespective of BHR than in those in high SES groups.

For many diseases poor health is both more prevalent and more severe in children in families with low socioeconomic status (SES) than in children from better circumstances.[1] While some studies suggest that there is an excess of severe asthma in children with low SES,[2,3] several studies have suggested that there is a higher prevalence of asthma in children in high SES families compared with those in low SES,[4,5] and other studies have not found any relationship between asthma prevalence and SES.[6,7]

During a study comparing asthma prevalence between Australian and New Zealand schoolchildren[10] we have had the opportunity to examine the relationship between SES and the prevalence of childhood asthma using a number of different criteria for asthma (including bronchial hyperresponsiveness (BHR)) and the use of asthma medications. This study is reported here.

METHODS

The methodology has been described in detail elsewhere.[10] Briefly a random sample of approximately 1300 European children was selected from the Auckland region. A questionnaire was completed by the parents, which included questions about demographic details of the child and parents, a history of asthma symptoms, diagnosis, current medications for asthma, and parental or other household members' smoking habits. The children underwent a histamine inhalation challenge using the method of Yan *et al.*[11] Children whose forced expiratory volume in one second (FEV_1) fell by more than 20% of baseline after receiving a cumulative dose of 7.8 μmols histamine or less were considered to have bronchial hyperresponsiveness (BHR). Socioeconomic status was defined from a revision of the Elley Irving socioeconomic six-point index for New Zealand occupations using the father's present or most recent occupation if he lived at home, otherwise the mother's occupation.[12] Five groupings were used (1–5) with group one representing the highest level and group five representing indices 5 and 6 combined.

Seven criteria for asthma prevalence were used for comparison with SES: any wheeze (including exercise wheeze) ever, any wheeze in the last 12 months and asthma diagnosed ever. The number of children with concomitant BHR in each category was also assessed. The seventh criteria was the presence or absence of BHR overall.

The current use of bronchodilators and asthma prophylactic drugs (inhaled steroids, cromoglycate) were examined by SES group in children with wheeze in the

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last 12 months, both with concurrent BHR or irrespective of BHR. Because of small numbers SES groups 1–2 and 4–6 were combined for this analysis.

The effect of the socioeconomic status of the children on the various measures of asthma was assessed by use of a logistic regression model. As it was thought that the smoking status of members of the household and the child's sex may have some confounding influence, these variables were also included in the model. Each of the asthma measures used were in the two category form, present or absent. Smoking was also classified as presence or absence of maternal smoker, paternal smoker or any smoker living in the household. The hypothesis considered was that there was a linear trend in the proportion of children with a positive outcome over the socioeconomic categories. With the size of sample available the power to detect an increase of 3.5% in outcome for each step from the highest socioeconomic category to the lowest was approximately 65 to 75%.

RESULTS

Of those sampled (84%) 1084 children were tested. SES could not be ascertained from the questionnaires in 34 children, leaving a final sample size of 1050.

Table 1 gives the crude prevalence rates for the five SES groups for the seven chosen asthma criteria and the probability (p) for a linear trend in SES after controlling for any smokers in the house and for sex of the child. A similar pattern of results is obtained regardless of whether the smoking variable being controlled for is mother's smoking, father's smoking or any smoker in the house. The lifetime or current prevalence rates for any wheeze (including exercise wheeze) are significantly higher in lower SES groups ($p = 0.029$ and $p = 0.046$ respectively), whereas there is no relationship between SES and the diagnosis of asthma, BHR or any combination of BHR with symptoms and previous asthma diagnosis.

Table 2 shows the prevalence of asthma medication use by SES group in asthmatic children using the two criteria for asthma which include wheeze in the last 12 months. There is a clear trend for greater use of asthma medications in higher SES groups and this is particularly notable for prophylactic drugs.

DISCUSSION

SES can be measured in a number of ways, the commonest being occupation, education or income. In other studies examining the relationship between SES and asthma prevalence the results have tended to be consistent irrespective of the measure of SES used. This study used occupation as the measure of SES.

The definition of asthma in previous studies has depended upon questionnaires and frequently upon parental reporting of asthma. In this study the parental questionnaire also sought information about wheezing, and the children were tested for BHR. The relationship between these factors and the diagnostic label 'asthma' is not straightforward. Furthermore, it is well established that asthma may be underdiagnosed.[11] Thus studies which have related asthma diagnosis to SES may yield different results from comparisons of symptoms and/or BHR to SES.

The higher prevalence of asthma diagnosis in high SES groups seen in earlier studies may reflect a SES effect on the disease label rather than the disease itself. This and other recent studies[7,8] have found no relationship between SES and asthma diagnosis, suggesting there may have been a change in the use of the label with time.

Studies defining asthma by wheezy symptoms have tended to find no relationship with SES.[4,9] In contrast this study found significantly higher rates of wheezy symptoms in children from lower SES groups. This is not explained by increased parental smoking in lower SES groups as the results were controlled for smokers in the household.

TABLE 1 *Observed asthma prevalence (%) by socioeconomic group*

	Socioeconomic group						
	1 (n=124)	2 (n=299)	3 (n=344)	4 (n=205)	5 and 6 (n=78)	Total (n=1050)	p value
Any wheeze/exercise wheeze ever	21.8	24.7	28.8	29.3	33.3	27.2	0.029
Any wheeze/exercise wheeze in the last 12 months	11.3	14.7	19.5	14.1	20.5	16.2	0.046
Asthma diagnosed ever	12.9	14.7	14.0	14.1	16.7	14.3	0.372
BHR on testing	21.0	20.4	21.8	18.0	19.2	20.4	0.903
BHR + any wheeze/exercise wheeze ever	10.5	11.4	13.7	10.7	12.8	12.0	0.379
BHR + any wheeze/exercise wheeze in last 12 months	8.1	8.0	11.9	7.3	10.3	9.3	0.412
BHR + asthma diagnosed ever	8.1	8.4	9.9	7.3	10.3	8.8	0.387

TABLE 2 *Prevalence (%) of asthma medication by socioeconomic group in children using two definitions of asthma*

	Socioeconomic group		
	1–2	3	4–6
Any wheeze exercise in last 12 months	(n=58)	(n=67)	(n=45)
Bronchodilators	65.5	49.3	51.1
Prophylactic drugs	36.2	20.9	17.8
BHR and any wheeze/exercise wheeze in last 12 months	(n=34)	(n=41)	(n=23)
Bronchodilators	76.5	70.7	65.2
Prophylactic drugs	41.2	29.3	26.1

Some workers consider that BHR is useful for the diagnosis of asthma in epidemiological surveys as it is an objective test, most current asthmatics exhibit BHR and BHR correlates with the severity of asthma.[14] This study found no relationship between SES and BHR or any combination of BHR with symptoms and asthma diagnosis.

This study suggests there is no relationship between SES and asthma prevalence in children. The finding of an increased prevalence of wheeze in low SES groups might be caused by an increase in the prevalence of factors which trigger or manifest wheezy episodes in the predisposed child. Such factors include respiratory tract infections,[15] which have been found to be more common in low SES groups, and house dust mites, which are found in higher concentrations in damp environments which probably occur more frequently in houses of poor families.

The finding of less frequent use of asthma medications in lower SES groups with current symptoms has been described[16] and is consistent with described social inequities in health.[1,17] There are a number of possible explanations for this finding. One possibility is that prescribing by the medical practitioner may vary according to the SES group of the child and their family. Alternatively there may be no difference in prescribing patterns, but rather a difference in uptake. Finally it may be that children with lower SES families have poorer, less regular and less frequent contact with medical practitioners and thus miss the opportunity for prescription of asthma drugs.

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